



California Hydrogen Highway Network

Integrated Presentation and Overview

presented to

**Ca H₂ Hwy Net Advisory Panel
at
CalEPA**

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Overview

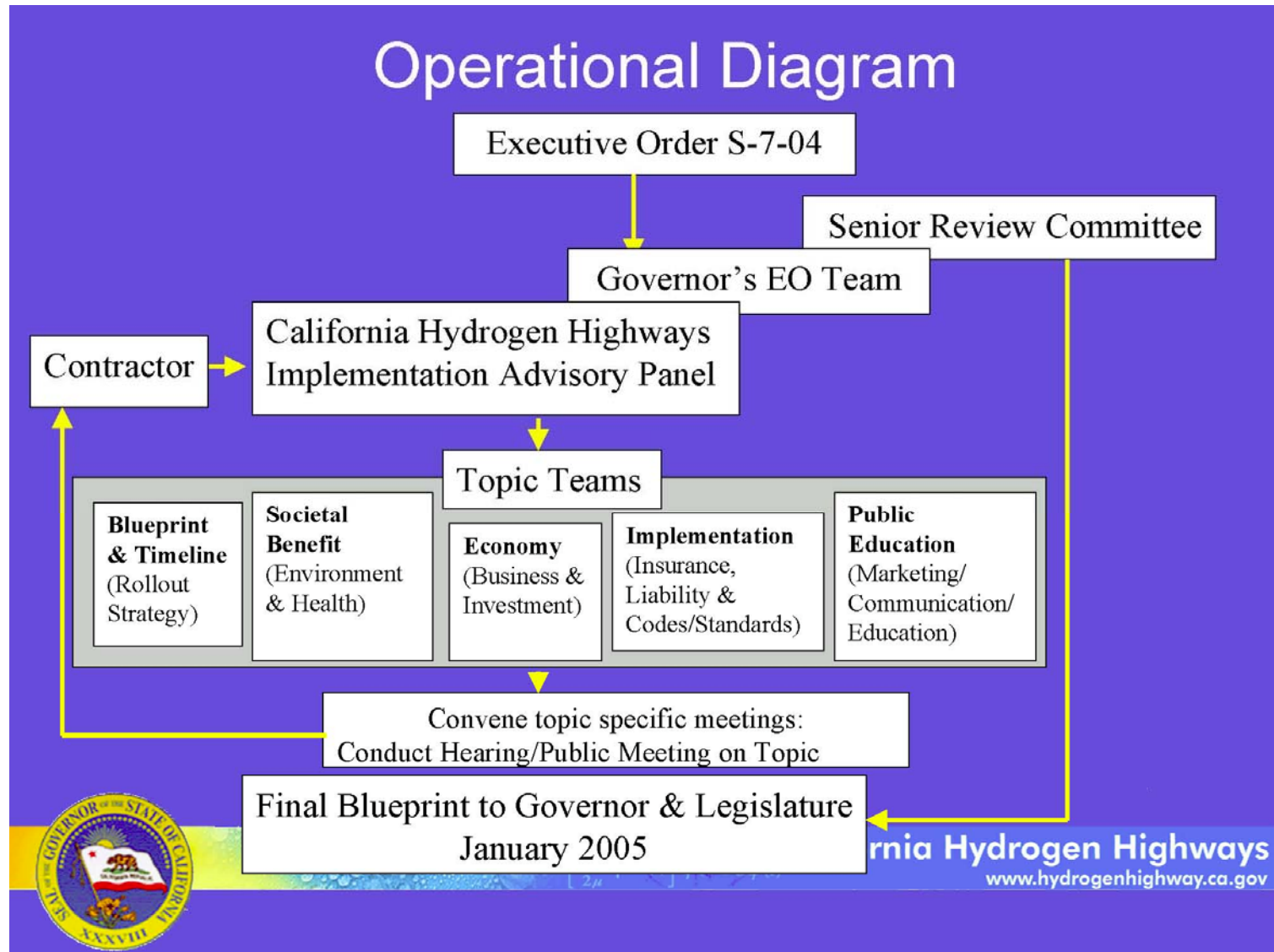
Topic Team Efforts

Next Steps and Summary

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A “Straw Man” Position Paper was Developed to Help Focus and Guide Topics Teams. Goals and Measures of Success are Shown Below

The “Straw Man” Goals for 2010

- Implement statewide codes and standards for hydrogen fueling stations
- Implement early regional refueling networks
- Establish societal benefits of hydrogen
- Move hydrogen vehicle and stationary power technologies toward commercialization through enabling vehicle refueling and providing incentives
- Build on California’s lead in Hydrogen and Fuel Cell Technologies

The “Straw Man” Measures of Success in 2010

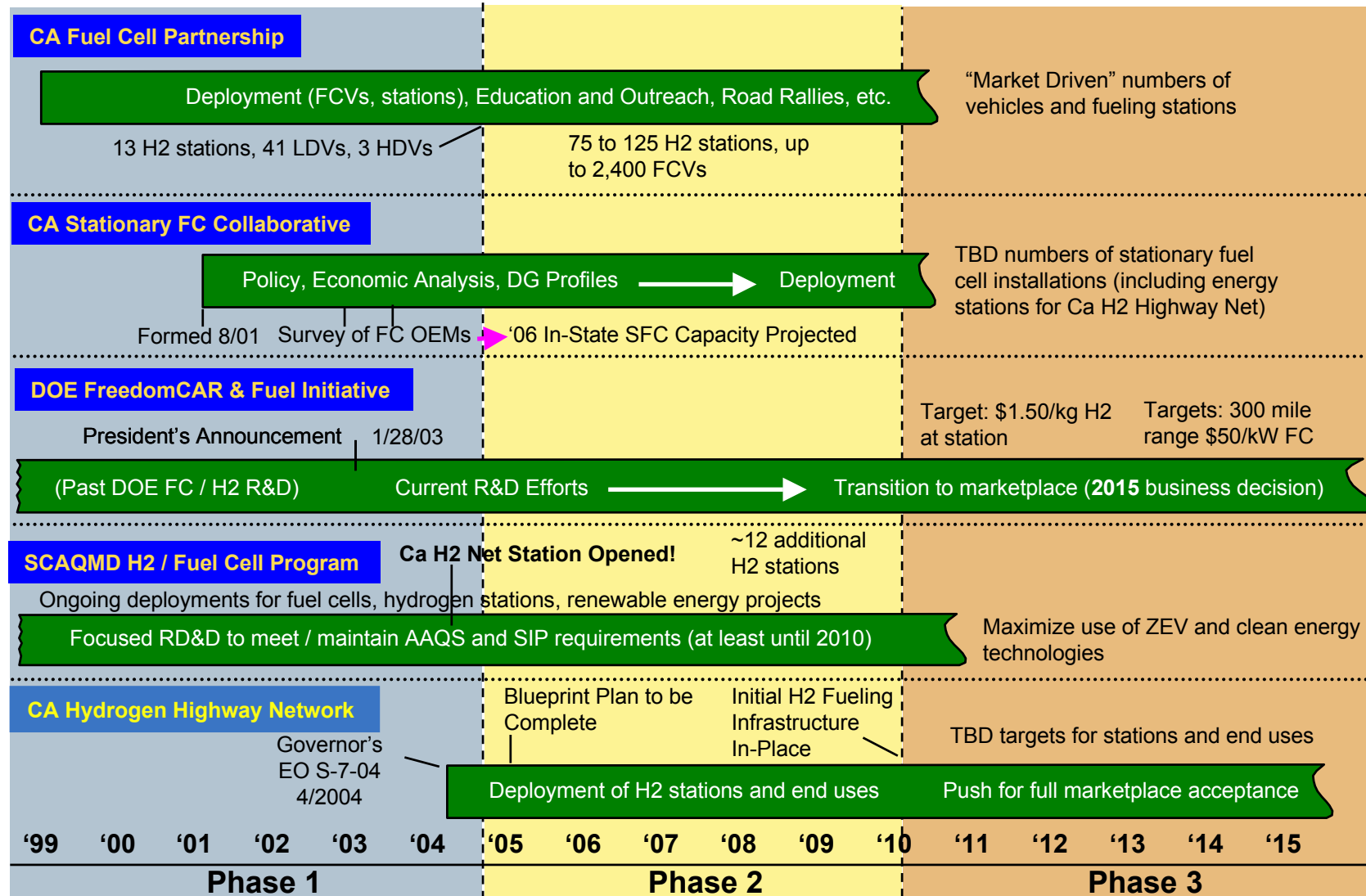
- Public access to hydrogen stations statewide
- Significant growth of renewable hydrogen
- Variety of end-users (balance of pathways)
- Public education on hydrogen
- Commercial viable hydrogen vehicles and hydrogen powered devices
- Hydrogen codes, standards, emergency response, training
- Research and training
- Jobs and business

The “Straw Man” Vision in 2010 is Only One Phase of the Multi-phase Transition

Phases of California’s Hydrogen Transition

- Phase 1: Current state of hydrogen in 2004
- Phase 2: Implement Blueprint plan up to 2010
- Phase 3: Sustainable mobility — 2010+
- Phase 4: Full implementation of hydrogen economy

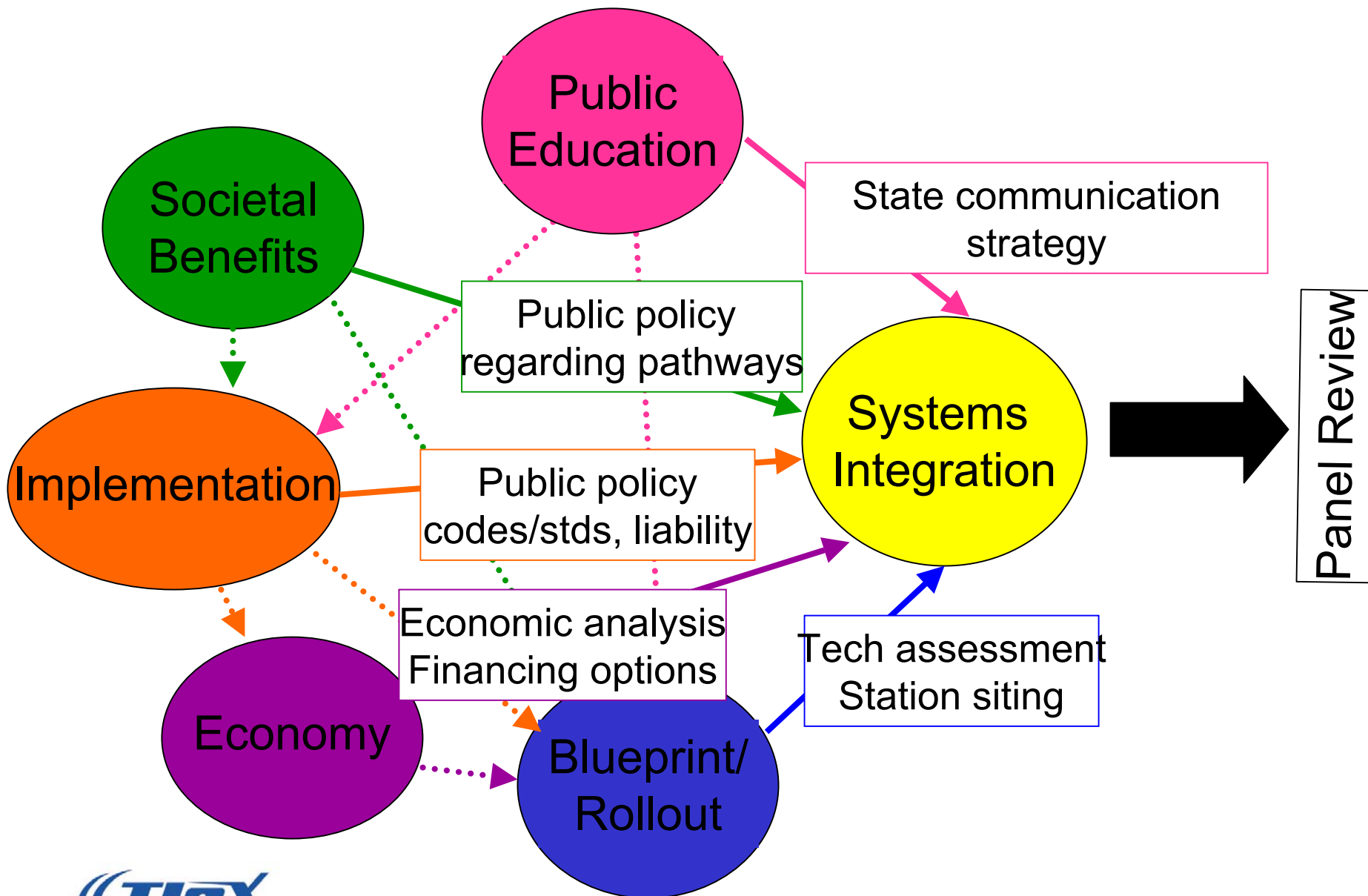
A Key to Success: Integration & Synergy w/ Related State, Local & Federal Activities



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Topic Teams Organized in June 4, 2004, with Active Participation from Industry, Environmental Groups, and Government

- Approximately 225 volunteers (!!) are working on five different Topic Teams
- All teams are organized and hard at work
- All have built strong foundations for the Blueprint Plan
- Teams getting guidance from EO Team and Advisory Panel
 - Straw man
 - Phase approach
- Societal Benefits, Public Education, Implementation, Economy and Blueprint Teams are laying the foundation and analytics for this effort
 - Scenario approach
 - Ways to enable hydrogen infrastructure
- Systems Integration Team (reps from all 5 teams) ensures effective interaction

Education Topic Team Status — Mission

- Mission of the team is to prepare a state-supported marketing, communications and public education plan to make the Hydrogen Highway Network successful
- The team's plan must address several audiences
 - Consumers and Customers
 - Government Policy Makers and Influencers
 - Technology and Industry Enablers
 - Education Community
- The team used expert panels at the August 12 public meeting to obtain insight into the needs of these audiences

Education Topic Team Status — Key Points from Public Meeting

- Carefully manage expectations. Don't promise too much, too soon.
- Early communication is crucial to success. Involve stakeholders during beginning phases of projects
- High-level point-of-contact is needed to address concerns of broad audiences
- Coordination with other on-going public education programs can leverage resources and augment effectiveness
- Promotion of hydrogen must be part of inclusive message of advancing a portfolio of clean technologies and fuels

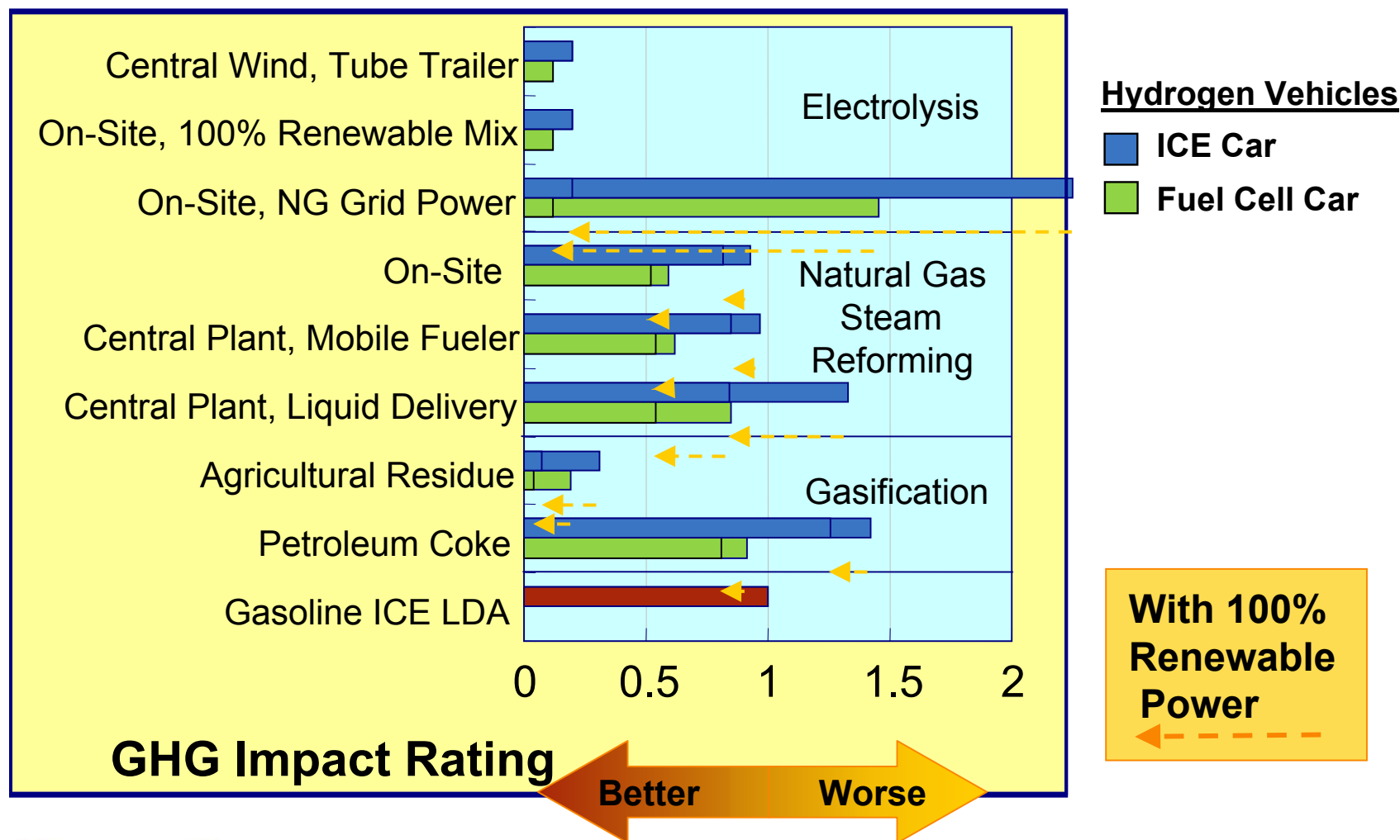
Societal Benefits Topic Team Status — Mission

- The Societal Benefits Team is quantifying the societal impacts of hydrogen pathways mostly likely to be commercially/technologically viable in the 2010 time frame and beyond
- The team is also studying policies that could successfully incentivize pathways with greater societal benefits
- The team is addressing the following topics
 - Pathways: well to tank production and distribution
 - Applications: vehicles, stationary power generations, other uses of hydrogen
 - Societal Impacts: criteria pollutants, GHGs, toxic emissions, effects on water and soil, energy independence
- Attention is given to various options for renewable power in California
- The Societal Benefit team presented its preliminary analyses on August 13

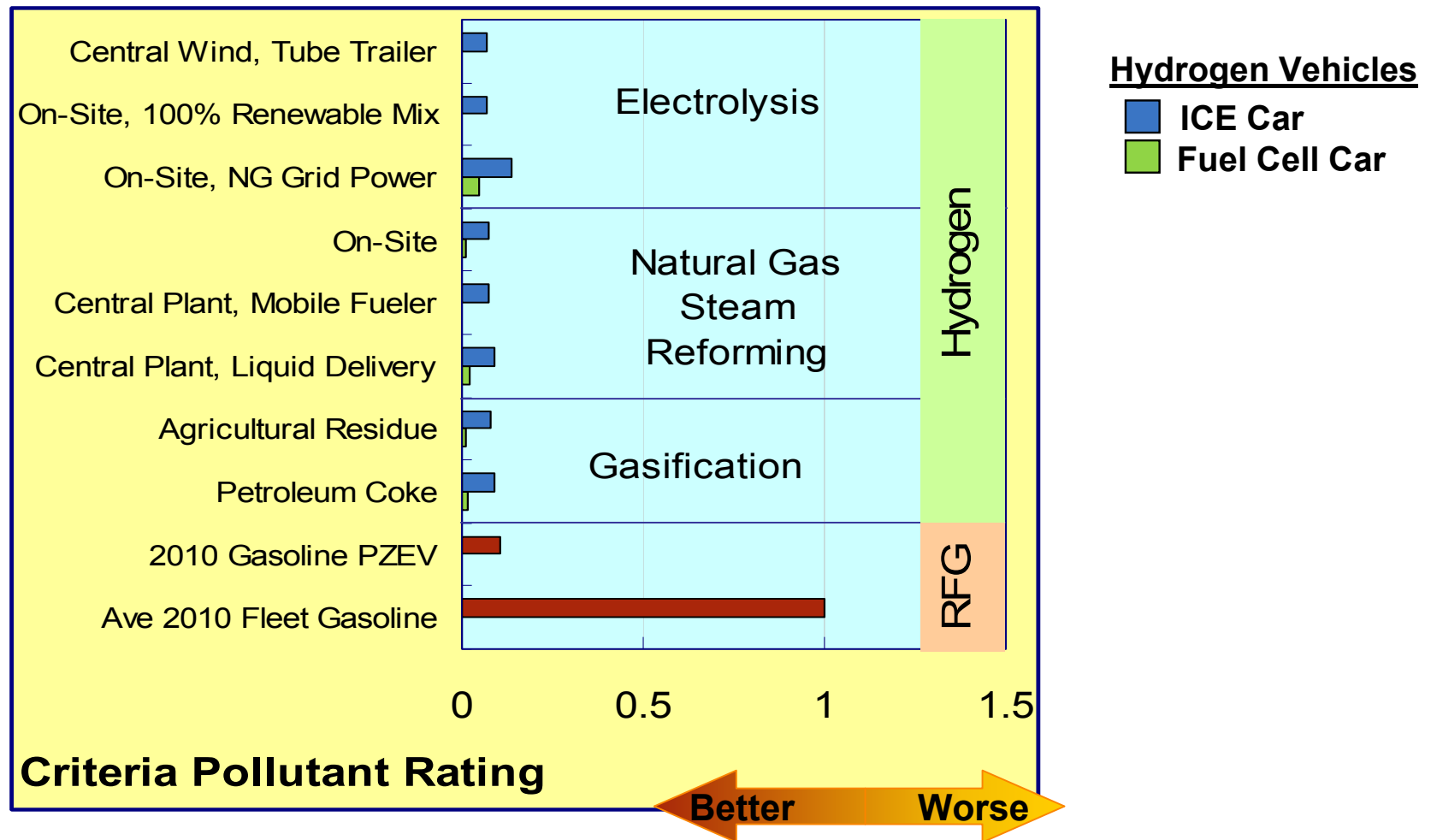
Societal Benefits Topic Team — Pathways and Applications Analyzed

Energy Carrier	Central Plant Production	Delivery	On-Site Production
Renewable Power			Electrolysis
	Electrolysis	Tube trailer	
Grid Power			Electrolysis
Natural gas	Steam reforming, Existing LH2 plant	LH2 Truck	
	Steam reforming	Mobile fueler	
			Steam reforming
Petroleum Coke	Gasification to H2	Mobile fueler	
Biomass (Ag waste)	Gasification to H2	Mobile fueler	

Societal Benefits Topic Team — Comparison of lifecycle GHG emissions for various pathways



Societal Benefits Topic Team — Most Hydrogen Pathways Reduce Criteria Pollutant Emissions



Implementation Topic Team Status — Mission

- The Implementation topic team is facilitating the timely, safe, and effective deployment of hydrogen infrastructure
- The team is supporting the development and uniform implementation of regulations, codes, and standards
- The team is also supporting the effective education of key stakeholders including regulatory and permitting officials, and first responders

Implementation Topic Team Status — Organization

- The Implementation topic team is split into two sections and nine sub-teams in order to address different implementation issues

Codes and Standards

1. Authorities Having Jurisdiction and Model Codes
 - 2a. Station Interface
 - 2b. Pressure Vessel Code
 - 2c. Vehicle Interface
 - 2d. Hydrogen Energy Stations
 - 2e. Clearance Distances
 - 2f. Field Certification

Risk Assessment and Management

1. Insurance and Liability
2. Public Safety and Risk Assessment

Economy Topic Team Status — Mission and Organization

- The Economy team identifies the public and private benefits and returns to a society that supports implementation of the hydrogen highway
- The team assesses all costs, sources of capital, and identifies public and private measures that will lead to a sustainable hydrogen fuel industry
- The team has five sub-teams
 - Private financing
 - Public financing
 - Station economics
 - Barriers
 - Benefits
- The Economy team will be presenting and seeking feedback on station costs, funding sources, and policies to promote a sustainable hydrogen fuel industry on September 14, 2004 at SCAQMD in Diamond Bar.

Blueprint Topic Team Status — Mission and Organization

- The Blueprint Team's mission is to develop a blueprint to deploy hydrogen vehicles to achieve societal benefits by using utilizing California leadership on fuel cells and hydrogen
- The team consists of four subgroups
 - **Group 1.** Production and Delivery (evaluate various readiness, technical, economic, environmental aspects of hydrogen production and delivery options)
 - **Group 2.** Applications (develop a catalog of potential hydrogen-powered applications)
 - **Group 3.** Sites (identify existing and planned hydrogen projects and establish site identification process for future sites)
 - **Group 4.** Commercialization (identify customer pull and technology push)
- The Blueprint team will hold its public workshop on October 7, 2004 at CalEPA in Sacramento

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Concluding Remarks

- Topic teams are functioning well and work is progressing
 - Three of five teams have completed public workshops
 - Economy Topic Team workshop on September 14, 2004
 - Blueprint Topic Team workshop on October 7, 2004
- Work in progress is available at Ca H2 Hwy Net web site
<http://www.hydrogenhighway.ca.gov/implement/implement.htm>
- Public comments are welcome either at this meeting or by using the “contact us” on the website
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